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ABSTRACT

This paper discusses an instrument developed to evaluate the characteristics of the major innovative elementary school science curriculum projects. The purpose of this self-assessment instrument is to determine which project is best for a particular school or classroom. The instrument does not attempt to compare one project with another and allows for the unique approach of each project. It is made up of nine categories each further divided into sub "key points" to provide a more detailed and comprehensive rating of each category. The categories include: (1) objectives and philosophy of school and project, (2) student-material interaction, (3) individual differences, (4) teacher training (inservice), (5) integration of conceptual schemes, (6) learning activities, (7) evaluation provisions, (8) cost of project, and (9) organization of project. The instrument has been presented to undergraduate students in an elementary science methods course, graduate students with teaching experience, and elementary school teachers for suggestions, revision and validation. It will be further revised and tested in several elementary schools becoming available for school use. (JR)

AN INSTRUMENT FOR ASSESSING ELEMENTARY SCIENCE CURRICULUM PROJECTS

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NEED: A proposal for an instrument to assess programs in secondary school science was stated in NSTA's Life Members Breakfast "Info Memo" of April 9, 1972. The need for such an instrument is even greater at the elementary school level since at this time there is no comprehensive rating-guide which can be used to evaluate the numerous characteristics of the major elementary science Curriculum projects such as SCIS, ESS or Science - A Process Approach. Even more crucial is the need for an instrument which can be used by elementary school teachers and administrators who are either working with a program, or are in the process of selecting one for their particular school or classroom. Questions such as "How good are these new programs?" or "What program would be best for our classrooms?" are the realistic questions which confront the teacher or principal who is in the process of evaluating one or more of the projects.

PURPOSE: The purpose of the self-assessment instrument is to assist in determining which project is best for a particular school or classroom. The instrument is also designed to help in the evaluation of a particular science program. This latter point will be discussed later on in the paper. The instrument is not intended for comparing one project with another. It allows for the uniqueness in approach and the differences in purposes of each project.

DESIGN: The format for the instrument was modeled after Suydam (1968) who developed an instrument for evaluating experimental research reports in mathematics education. The content for this instrument was synthesized from the following three sources:

1. the questions developed for evaluation of a science curriculum outlined in "Science for the Seventies," an elementary science program developed by the Pennsylvania Department of Education (1970)
2. a checklist for assessing a science program prepared by U.S.O.E. in 1964, (U. S. Office of Education), and
3. a description of some characteristics of a good elementary school science program from Rethinking Science Education, N.S.S.E.'s 59th Yearbook, (National Society for the Study of Education)

Items included under each question as "key points" were characteristics repeated by Andrews (1969), Brehm (1971), and Hurd and Gallagher (1968).

The instrument is made up of nine categories - each represented by a question and further divided into sub "key points" to provide for a more comprehensive rating in each category. The nine categories include:

1. Objectives and philosophy of project and school
2. Student-material interaction
3. Individual differences
4. Teacher training and in-service
5. Integration of conceptual themes
6. Learning activities
7. Evaluation provisions
8. Cost of project
9. Overall organization and presentation of project

The actual rating is based on a five point scale which is explained on the first page of the instrument.

DISCUSSION OF DESIGN: A review of several articles on the new science curricula stressed the need for goal definition. Hurd (1969) points out that

many terms such as discovery, process and inquiry are not clearly defined and that some programs have labels that are not clearly understood. He states that the new labels serve more as slogans instead of indicating educational practice and that it is difficult to distinguish performance taught under one label or another. If the same could be said for the elementary school programs, then it can be suggested that an evaluation of the programs would have to involve value judgements. Evaluation is a value-weighted interpretation of goals, objectives, subject matter, teachability and learnability of materials, and costs in time and effort. Should an instrument for evaluating elementary science programs allow for such subjectivity in the selection of a project?

The instrument presented here provides only a framework from which one determines which program is best for a particular teacher or school. This then means a clear definition of one's goals of teaching is needed. Andrews (1969) supports this when he states that in using the guidelines he developed for examining new curricula a careful definition of one's goals for science instruction is necessary. The same was recently implied in the December 1972 issue of Science and Children by members of the Science Education Center (1972) at the University of Oklahoma in their list of criteria for evaluating elementary school science curricula. They state that "someone else's purposes for teaching science in the elementary schoo' need not be the same as ours." The N.S.S.E. went a step further in their 59th Yearbook by stating that a program in elementary science can be effectively evaluated when the objectives of the program are clear and have been accepted by the teachers and administrators. Fish (1971) also recognized the agreement between the stated goals of the curriculum and the goals of the school or teacher. She asks, "Are these the goals we want?"

It is hoped that consideration of goal definition will diminish any bias to one philosophical viewpoint by any one of the projects. To add to the

comprehensiveness of the instrument, course content validity, pedagogical validity, and social and philosophical validity were also considered. These terms were defined by Hurd (1969) and were also considered in developing the "key points" of the instrument. Hurd and Gallagher (1968) did not raise the question of cost because "human resources are always more critical than financial resources." Realizing, however, that any administrator would ask "how much?" the question of the project's cost was included in the instrument.

Recent findings from some of our more contemporary psychologists as well as the influence of the psychology of child development also provided many of the "key points" for the questions dealing with learning activities and child participation.

PROCEDURE: The instrument has been presented to the following groups:

1. Approximately 75 undergraduate students in elementary science methods classes for discussion, clarification and suggestions.
2. A group of 28 master degree and doctoral students in elementary education with teaching experience for revision and validation.
3. A summer workshop in elementary science for further discussion, clarification and rewriting, and
4. A group of 25 K-3 elementary teachers in the State College, Pennsylvania, area school district for use in evaluating their SAPA program.

USING THE INSTRUMENT: From those who have used the instrument to review one or more of the science projects, it was mentioned that the model is quite comprehensive and representative of the many criteria used in examining a curriculum. It becomes apparent after using the instrument with several projects that "the best one" is the one satisfying the goals of both the teacher

and the school district. Also, the instrument provides the reviewer the necessary framework from which he can clearly distinguish between the needs of the children from his own. For example, questions 1, 4, 7, and 8 reflect teacher concerns while questions 2, 3, 5, 6, and part of 9 are directed toward the child's needs and the learning process.

The total score of the assessment is not as important as the individual scores for each question unless the projects are quite different in their goals, organization and content. It has been suggested that the individual using the instrument rank the questions in a priority that reflects the particular needs of his class or the school. For example, a principal may feel that questions 3 and 8 are of higher priority because of the grouping in his school and his limited budget. Another school system may place emphasis on questions 1 and 4 if the selection committee feels that teachers would like the program if they had proper presentation to the project and adequate training. It is therefore suggested that decisions be made on what is important to the teacher or the school before the program is finally evaluated.

The instrument can take from 20 minutes to one hour to use depending on the evaluator's knowledge of the program being considered, familiarity with the instrument and the number of people involved in the decision making process. If the instrument is being used to select a project then several sessions may be needed to examine the materials, manuals, texts, etc. of the program. The instrument can also be used for discussion purposes. Many teachers using the instrument indicate that the questions or "key points" could be used in asking questions about the program or in talking with the project's representative.

The instrument has been designed to be flexible and yet provide some organizatior for decision making. It can be used in its entirety or in part, in both formal and informal situations, and by one person or by a group. It

can be used to select a project or evaluate one. It was designed to assist you - the one who is in a position to make the decision.

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AN INSTRUMENT FOR ASSESSING ELEMENTARY SCIENCE CURRICULUM PROJECTS*

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Directions:

This self-assessment instrument is based on the nine underlined questions which follow. The quality of the program (project) in terms of each question is rated on a five-point scale. Certain "key points" should be considered in determining a rating for each question. These are listed below the question, followed by adjectives which indicate the continuum on which the "key point" should be assessed. DO NOT make a response to these "key points." They are intended to focus the attention of the rater(s) on the same pertinent aspects of each question. The specifications for these five points are:

1. Poor:	none or too few of the "key points" are met
2. Fair:	a few "key points" are met
3. Good:	some "key points" are met
4. Very good:	most "key points" are met
5. Excellent:	all "key points" for the question are met; nothing essential could be added

Please make only nine responses for each project, one for each question. Responses may be noted by circling the appropriate value on the five-point scale following each question.

*Modeled after: Suydam, M. "An Instrument for Evaluating Experimental Educational Research Reports." The Journal of Educational Research, January 1968.

An Instrument for Assessing Elementary Science Curriculum Projects

1. How adequately do the purposes and objectives of the project agree with yours or the school's? (5-4-3-2-1)

a. Goals	
1. Real life values	(relevant--irrelevant)
2. Modern learning theory basis	(relevant--irrelevant)
	(current--out-dated)
b. Project's philosophy	(clear--unclear)
	(agree--disagree)
c. Teacher enthusiasm for program	(interested--not-interested)
	(motivated--not-motivated)

2. How sufficient are the supplied materials for student-material interaction? (5-4-3-2-1)

a. Student materials (equipment)	(available--unavailable)
	(sufficient--insufficient)
	(ordered--improvised)
b. Student materials (printed)	
1. Textbook	(available--unavailable)
2. Workbook	(available--unavailable)
3. Worksheets	(available--unavailable)
c. Manipulation	(reasonable--unreasonable)
d. Storage requirements	(reasonable--unreasonable)
e. Learning-teaching aids	(suitable--unsuitable)
f. Teacher preparation	(essential--non-essential)

3. How adequately does the program provide for all children? (5-4-3-2-1)

a. Provisions for individual differences	
1. Development of gifted student	(specified--unspecified)
2. Consideration for below average	(specified--unspecified)
b. Pacing of instructional materials	(adequate--inadequate)
c. Provisions for successful achievement	(noted--not-noted)
d. Provisions for cultural differences	(specified--unspecified)

4. How adequate are the provisions for teacher training? (5-4-3-2-1)

a. Consulting service	(available--unavailable)
b. In-service programs	(available--unavailable)
c. Recency of teacher's science background	(important--not-important)
d. Printed materials for teachers	
1. Manuals	(available--unavailable)
2. Reference books	(available--unavailable)
3. Newsletters, periodic reports	(available--unavailable)

5. How appropriately integrated are the broad conceptual themes? (5-4-3-2-1)

a. Content	
1. Grade level	(specified--unspecified) (flexible--rigid)
2. Biological, physical, and earth sciences	(balanced--unbalanced) (related--unrelated)
3. Sequence	(clear--unclear) (logical--illogical)
b. Historical, biographical and philosophical aspects of science	(emphasized--unemphasized)
c. Social utility issues	(emphasized--unemphasized)
d. Coordination with mathematics	(related--unrelated)
e. Provision for development of process skills	(extensive--limited)

6. How reasonably are the children involved in the learning activities? (5-4-3-2-1)

a. Purpose of activity	(important--not-important) (clear--unclear)
b. Opportunities for independent work	(extensive--limited)
c. Opportunities for open-ended and problem-solving activities	(sufficient--insufficient) (emphasized--not-emphasized) (appropriate--inappropriate)
d. Variation in activities	(sufficient--insufficient)
e. Provision for out-of-classroom work	(noted--not-noted)
f. Integration with learnings	(satisfactory--unsatisfactory)

7. How proper are the instruments for measuring student performance and evaluating the project? (5-4-3-2-1)

a. Techniques or instruments	
1. Performance tests	(available--unavailable)
2. Rating scales	(available--unavailable)
3. Teacher-made tests	(necessary-unnecessary)
b. Criteria for project evaluation	(available--unavailable)
c. Evidence of project evaluation	
1. teacher comments and reactions	(reported--not-reported)
2. pupil comments and reactions	(reported--not-reported)
3. understanding of concepts	(pre-test--post-test)
4. observation of students	(reported--not-reported)
5. feedback processes	(specified--unspecified)
6. control groups	(noted--not-noted)
7. sample (test population)	(appropriate--inappropriate) (random--unspecified)

8. How practical or reasonable is the cost of the project?

a.	Initial cost per class of 30	(noted--not-noted) (reasonable--unreasonable)
b.	Annual cost per class of 30	(noted--not-noted) (reasonable--not-noted)
c.	Additional facilities or equipment	(required--not-required)
d.	Teacher training	(provided--not-provided)
e.	Textbooks	(necessary--optional)
f.	Storage requirements	(important--not-important)
g.	Materials	(permanent--expendable)

9. How adequately is the project presented?

a.	Organization	(excellent--poor) (logical--illogical)
b.	Style, design	(attractive--unattractive) (appropriate--inappropriate)
c.	Visual aids	(appealing--unappealing) (appropriate--inappropriate)